

Application Serial No.: 09/886,213
Reply to Office Action dated May 28, 2004

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 2-4, 6-8, 25-28, and 33-36 are pending in this case, Claims 2, 25-27, and 33-36 having been amended, Claims 29-32 having been canceled without prejudice or disclaimer, and Claim 37 having been added by way of the present Amendment.

Claims 2-4, 6-8, and 28 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al. (U.S. Patent No. 6,423,651 B1) in view of Haluska (U.S. Patent No. 5,380,567). Claims 25-27 and 29-36 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al. in view of Haluska and further in view of Chizinsky (U.S. Patent No. 5,252,807). For the reasons discussed below, the Applicants request the withdrawal of the obviousness rejections.

The basic requirements for establishing a *prima facie* case of obviousness as set forth in MPEP 2143 include (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, (2) there must be a reasonable expectation of success, and (3) the reference (or references when combined) must teach or suggest all of the claim limitations. The Applicant submits that a *prima facie* case of obviousness cannot be established in the present case because the references, either taken singularly or in combination, do not teach or suggest all of the claim limitations.

Claims 2 and 25-27 of the present application recite methods to heat-treat a substrate coated with a coating solution which oxidizes at a high temperature, where the method comprises, among other steps, the steps of lowering an oxygen concentration of a treatment

atmosphere in a heating chamber when a temperature of the substrate in the heating chamber is lower than the temperature at which the coating solution oxidizes, and removing the substrate from the heating chamber by a moving mechanism having a cooling unit while cooling the substrate by the cooling unit to a temperature lower than the temperature at which the coating solution oxidizes. Claims 33-36 recite methods to heat-treat a substrate in a heating chamber, where the method comprises, among other steps, the step of removing the substrate from a heating chamber by a moving mechanism having a cooling unit while cooling the substrate by the cooling unit. The Applicants submit that the cited references, either taken singularly or in combination, do not disclose the above steps.

By way of illustration and not limitation, the present application describes an embodiment in which a substrate is removed from a heating chamber by a moving mechanism (155, 121) having a cooling unit (153) while it is being cooled by the cooling unit to a temperature lower than the temperature at which the coating solution oxidizes (Figs. 14 and 21). The cited references do not disclose or suggest such features.

The Nakano et al. and Haluska references do not discuss methods to heat-treat a substrate in a heating chamber, including the step of removing the substrate from a heating chamber by a moving mechanism having a cooling unit while cooling the substrate by the cooling unit, as recited in Claims 2, 25-27, and 33-36 of the present application. No such moving mechanism with a cooling unit is described or suggested by the Nakano et al. and Haluska references.

The Chizinsky reference describes a rapid thermal processor for heating and cooling semiconductor material in an elongated process chamber having a base, side and top walls which enclose a heater plate assembly. A cooling shutter is adapted in the chamber to shield

the workpiece from the heater plate when the cooling process takes place. In the Chizinsky reference, the side walls and top of the chamber are provided with a cooling means so as to effectuate extreme temperature differential between the heated plate and top portions of the chamber, as described in column 2, lines 51-54. The Chizinsky reference describes a transport arm (54) that has a receiving support surface (130) disposed at a distal end. The transport arm (54) is used to retrieve the wafers (62) from chamber (24) for storage in the wafer supply (136).

In the Chizinsky reference, a cooled heat-absorbing surface is located in one end of the vertically disposed chamber opposite to the heated plate arranged within the other end of the chamber. A wafer is vertically transported to close proximity to the heated plate so that it is rapidly and uniformly heated. It is then rapidly transported away from close proximity to the heated plate to a region opposite the heated surface where it is in proximity to the cooled heat-absorbing surface so that it is rapidly and uniformly cooled. The wafer is thus thermally transformed in that region of the thermal processor. The wafer is heated and then cooled in the thermal processor. It is not cooled by a moving mechanism having a cooling unit while being removed from the thermal processor.

The Applicants respectfully submit that the support surface (130) of the Chizinsky reference is not a cooling unit that is used to cool the substrate while removing the substrate from the heating chamber. The support surface (130) is merely a wafer-receiving surface disposed on the distal end of the transport arm (54)(column 7, lines 19 and 20). The Chizinsky reference does not disclose or suggest a cooling unit, as recited in Claims 2, 25-27, and 33-36 of the present application.

Therefore, the Chizinsky reference requires both a cooling period and a transferring or

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removing period.

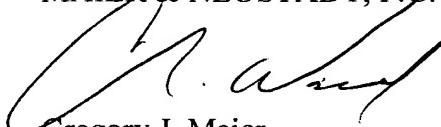
Accordingly, the Applicants respectfully submit that a *prima facie* case of obviousness with regard to Claims 2, 25-27, and 33-36 cannot be established based upon the combined teachings of the cited references. Therefore, the Applicants respectfully request the withdrawal of the obviousness rejections of Claims 2, 25-27, and 33-36. Claims 3, 4, 6-8, and 28 are allowable for at least the reasons indicated for Claim 2, from which they depend.

Newly added Claim 37 is considered allowable as it recites features of the invention that are neither disclosed nor suggested by all the references of record. Support for this new claim can be found in the specification, for example, on page 11, lines 15, 16, 19, 20, 30, and 31, and in FIG. 7. New Claim 37 defines that the step (b) is performed for a period longer than the steps (a) and (c).

Consequently, in view of the above discussion, it is respectfully submitted that the present application is in condition for formal allowance and an early and favorable reconsideration of this application is therefore requested.

Respectfully Submitted,

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